Original Research Paper

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TO EVALUATE THE EFFICACY OF FENTANYL (50 µgm) AND DEXMEDETOMIDINE (100 µgm) AS ADJUVANT TO 0.75% ROPIVACAINE IN SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK

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ABSTRACT **Aims & Objective:** To compare efficacy Dexmedetomidine versus Fentanyl as adjuvant in supraclavicular brachial plexus block for upper limb surgeries. To compare preoperative hemodynamic changes. To evaluate the onset and duration of sensory and motor blockage. Duration of post-operative analgesia and complication associated with the drugs used. **Material & Methods:** Ninety patients aged between 18 to 60 years with ASA grade 1, 2 and 3 posted for elective upper limb surgeries. Of which 3 groups of 30 patients randomly devided. Group:-F Ropivacaine (0.75%) 20ml + Fentanyl 50mcg (1ml), Group:-D Ropivacaine (0.75%) 20ml + Dexmedetomidine 100 mcg (1ml) ,Group:-C Ropivacaine (0.75%) 20ml + normal saline (1ml) **Result:** The 3 groups were comparable in demographic data. There was faster onset of sensory block with fentanyl group and prolonged duration of analgesia with dexmedetomidine group. There were no significant side effect. **Conclution:** As compared to Fentanyl 50mcg(1ml) Dexmedetomidine 100mcg (1ml) as an adjuvant to Ropivacaine (0.75%) 20ml in supraclavicular brachial plexus block for upper limb surgeries delays the onset time for sensory & motor block and prolongs the duration of sensory &motor blocks with longer duration of postoperative analgesia.

KEYWORDS :

INTRODUCTION

Anaesthesia has evolved into a speciality subject over decades with lot of improvement in methods employed and drugs used to provide anaesthesia with least complication. General anaesthesia was one of the most common methods employed to provide anaesthesia for upper limb surgeries. With introduction of newer and safer local anaesthetics and better advantage, regional anaesthesia has taken over as principle technique for upper limb surgeries. Supraclavicular plexus block provides anaesthesia for surgeries of lower third of humerus, around elbow joint, forearm and hand. This block also relieves tourniquet pain. Supraclavicular plexus block technique was chosen for upper limb surgeries in our study.(1,2) The aim of our study is to compare the efficacy of Dexmedetomidine versus Fentanyl as adjuvant in supraclavicular brachial plexus block for upper limb surgeries

MATERIALS AND METHODS

After having approval from institutional ethical committee and written informed consent from the patient the study was conducted M P Shah medical college, Jamnagar during april 2021 to November 2021.Ninety patients aged between 18 to 60 years with ASA grade 1, 2 and 3 posted for elective upper limb surgeries were included in the study. The study patients were randomly divided into 3 groups with 30 patients in each group.

Exclusion Criteria.

- Patients who are unwilling or uncooperative
- Any bleeding disorder and patients on anticoagulant treatment
- Patients having Neurological and musculoskeletal diseases
- Geriatric, paediatric, pregnant patient
- Local infection at injection sites
- History of allergies to local anaesthetic

All patients are assessed for their preoperative condition a day before surgery. Patient's demographic data like age, sex, height, weight was recorded. Vitals like heart rate, Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and SpO2 are recorded. Thorough clinical history and findings of the examination of airway, cardiovascular, respiratory and other systems are recorded. Routine investigations like Complete Blood Count, Random Blood Sugar (RBS), Serum Creatinine, Chest X ray, coagulation profile, ECG are done in all patients. Patients are fasted for6 hrs before time of operation.

Before operation patients were explained about the procedure and written informed consent taken. Intravenous line secured, Standard monitors such as electrocardiogram, pulse oximeter, and blood pressure cuff were applied, and patient's baseline parameter such as pulse, blood pressure, respiratory rate, and SpO2 was recorded. All patients were premedicated with (on operation table): injection ondansetron 4 mg intravenously, Inj. Glycopyrolate 0.2mg intravenously, Inj.Midazolam 1mg intravenously.

Under aseptic and antiseptic precaution, brachial plexus block was given through supraclavicular classical approach(3). The patients were placed in the dorsal recumbent position with the head turned away from the site of brachial block. Midclavicular point, external jugular vein and subclavian artery pulsation were identified. About 1cm above the midclavicular point just lateral to subclavian artery pulsation, a 23×11/2" G needle was introduced and directed caudal, downward anmedially toward the first rib until paraesthesia was noted along radial and ulnar distribution or motor response was elicited. After performing negative aspiration for blood in order to avoid intravascular injection,the anaesthetic drug was administered in incremental doses.

Immediately after block, patients were evaluated for the assessment of onset of sensory and motor blockade. Vitals were recorded before and after the procedure, at 5min and there after every 10min till end of procedure and postoperatively at every 1 hour till 4 hours in recovery room and then 2 hourly in ward upto 10 hours (at 6hr, 8hr, 10hr). Sensory block was assessed by pinprick test using a needle at each minute after the completion of drug injection in the corresponding dermatomal areas till complete blockade. The sensory and motor characteristics of the blockade were assessed as per the criteria mentioned below:

Sensory Characteristics

Onset – is taken as time duration from end of injection to dull response to pin prick.

Duration – is taken as time duration from complete block to feeling of pin prick sensation.

Motor Characteristics

Onset – is taken as time duration from end of injection to decreased thumb movement

Duration – is taken as time duration from complete block to reappearance of thumb movement

Duration Of Post Operative Analgesia:

It is as time duration from onset of sensory block to first rescue analgesic requested by the patient at VAS ≥ 3.If the block was considered to be adequate, surgeons were allowed to apply tourniquet and start the surgery. Patients were monitored for nausea, vomiting, hypersensitivity reaction, any sign of cardiovascular system (CVS) or central nervous system (CNS) toxicity, evidence of pneumothorax, hematoma, and post-block neuropathy during the study. The patients

were educated regarding reporting of pain using VAS which is of 10 points where "0" indicates no pain and "10" indicates worst possible pain. INJ. DICLOFENAC SODIUM 75 mg was given intramuscularly and the time for rescue analgesia noted. (VAS≥3).

All the data were filled in proforma and were statistically analyzed by Anova test and probability less than 0.05($p<0.05$) was considered statistically significant. $P<0.001$ was considered as highly significant.

RESULTS:

The patients in the study groups were comparable for age, sex, weight,height, ASA physical status which were statistically not significant($P>0.05$) as shown in Table-1.

Table 1 Mean Demographic Data In Group C, Group D and Group F

Variable	Studygroup						P value
	GroupC		GroupF		GroupD		
	Mean	SD	Mean	SD	Mean	SD	
Age(inYears)	39.93	12.90	38.47	13.47	38.53	11.76	0.883
Weight (inKgs)	64.43	5.928	65.90	7.76	67.033	7.14	0.356
Gender(M/F)	19/11		23/07		18/12		

Table 2 Mean onset time of complete sensory block in Group C, Group F and Group D

Variable	Study group						P value (Anova)
	Group C		Group F		Group D		
	Mean	SD	Mean	SD	Mean	SD	
Onset time of sensory block (in minutes)	16.46	2.11	10.26	1.31	11.03	2.19	<0.001

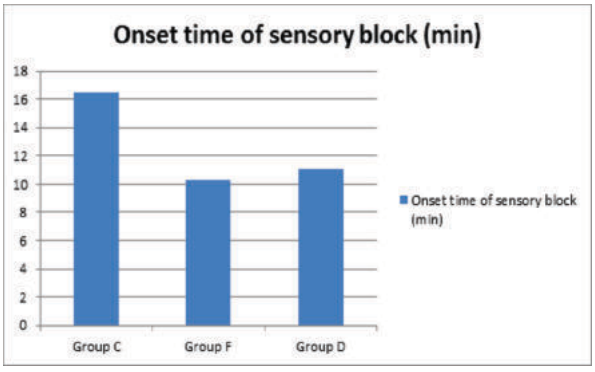

Chart 1

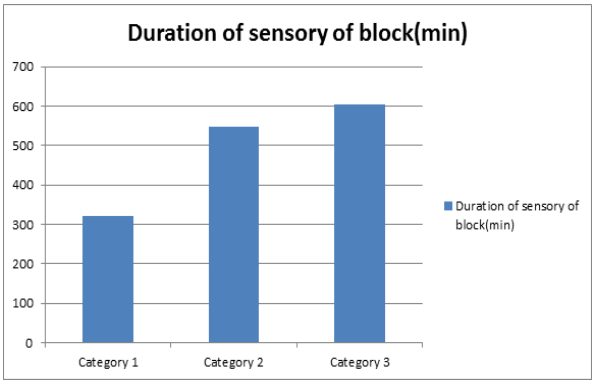

Chart 2

Table–3 Mean duration of motor block in Group C, Group F and Group D

Variable	Study group						P value (Anova)
	Group C		Group F		Group D		
	Mean	SD	Mean	SD	Mean	SD	
Duration of motor block (in minutes)	242	31.66	441.33	36.83	503.33	25.33	<0.001

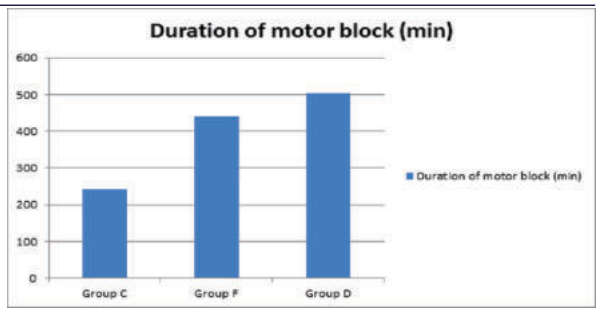

Chart 3 Mean duration of motor block in Group C, Group F and Group D

Table 4 Mean duration of analgesia in Group C, Group F and Group D

Variable	Study group						P value (Anova)
	Group C		Group F		Group D		
	Mean	SD	Mean	SD	Mean	SD	
Duration of analgesia(in minutes)	395	19.77	657.33	17.20	736.33	20.42	<0.001

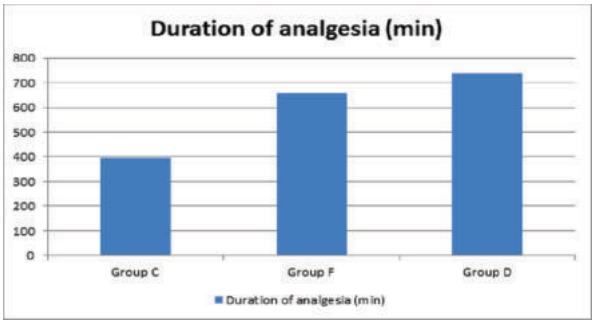

Chart 4 Mean duration of analgesia in Group C, Group F, and Group D

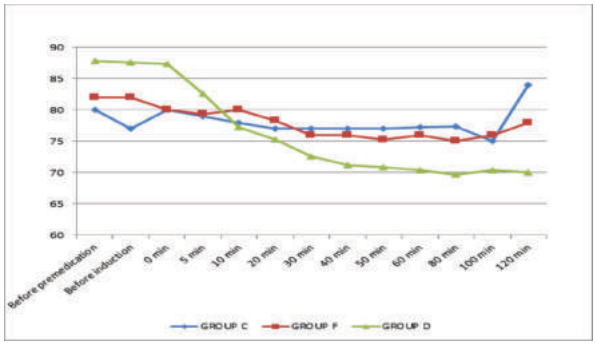

Chart 5 Intraoperative mean heart rate in Group C, Group F and Group D

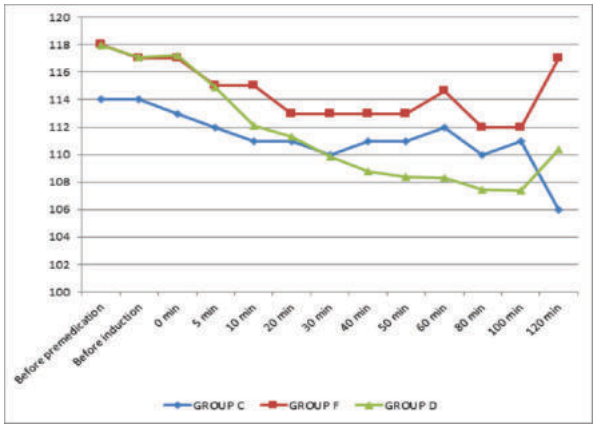

Chart 6 Intra-operative mean systolic blood pressure in Group C, Group F, and Group D

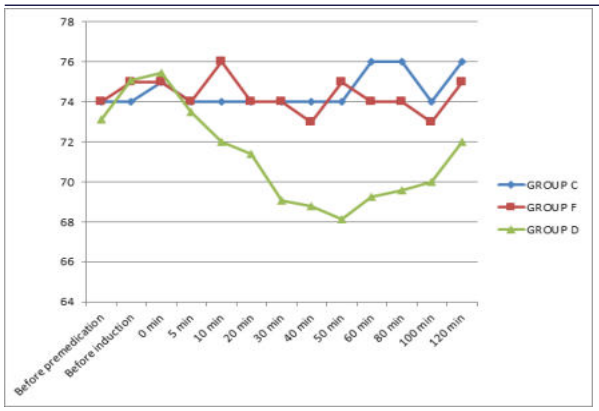

Chart 7 Intra-operative mean diastolic blood pressure in Group C, Group F, and Group D

DISCUSSION

In this prospective, randomized, comparative clinical trial, we had compared the effect of 100µg (1ml) of Dexmedetomidine versus 50µg (1ml) of Fentanyl as an adjuvant to 20 ml Ropivacaine (0.75%) in supraclavicular brachial plexus block, on the onset time and duration of sensory and motor block as well as on the duration of post-operative analgesia.

Onset Time Of Complete Sensory And Motor Block:

In Our study the mean onset time of complete sensory block in Group C, Group F and Group D was 16.46 ± 2.11, 10.26 ± 1.31 and 11.03 ± 2.19 minutes respectively and mean onset time of complete motor block in Group C, Group F and Group D was 21.46 ± 2.48, 13.3 ± 1.44 and 16.10 ± 2.10 minutes respectively.After applying anova test both differences were statistically highly significant (P<0.001)

These results are comparable to other studies In february 2018 Pradeep Sahi, Roopesh Kumar, Chavi Sethi, Neha Gupta, Ashok Singh, Prashasti Saxena(4) conducted study was Evaluation of the Effects of Fentanyl and Dexmedetomidine as an Adjuvants in Supraclavicular Brachial Plexus Block Achieved with Ropivacaine . 90 patients were randomly allocated to either receive 30 ml Ropivacaine 0.5% (Group 1), 30 ml Ropivacaine 0.5% with Fentanyl (Group 2) or 30 ml Ropivacaine 0.5% with Dexmedetomidine (Group 3). Onset of Complete sensory block in all the three groups of 5.05±0.89, 2.32±0.51 and 2.53±0.48 min in group 1, 2 and 3 respectively and mean onset time of complete motor block 35.5±2.60 , 23.32±2.28 and 24.72±2.40 min in group 1, 2 and 3 respectively.

Duration Of Sensory And Motor Block:

In our study mean duration of motor block in Group C ,F and D is 242±31.66,441.33± 36.83 and 503.33 ± 25.33 minutes respectively and mean duration of sensory block in Group C,F and D is 321 ± 20.73, 547.33 ± 27.75 and 605 ± 27.13 minutes respectively.

These results are comparable to other studies In February 2020 Dr D.B.V. Madhusudhanarao1, Dr. Kadiri Srujana[5]conducted study wasTo compare the effects of Fentanyl and Dexmedetomidine as adjuvants to Ropivacaine in brachial plexus block. GROUP D received 30ml of 0.5% Ropivacaine with 20 µg Dexmedetomidine and GROUP F received 30ml of 0.5% Ropivacaine with 50µg Fentanyl. Duration of motor block in group F and group D is 457.6 ± 43.58 min and 618.7 ± 100.7 min respectively and Duration of sensory in group F and group D is509.4 ± 45.43 min and 683.83 ± 96.96 min respectively.

Duration Of Analgesia:

In our study, the mean duration of analgesia in Group C, Group F and Group D was 386 ± 30.69, 664.33 ± 30.02 and 767.66 ± 28 minutes respectively.

This results are comparable with In February 2018 Pradeep Sahi, Roopesh Kumar, Chavi Sethi, Neha Gupta, Ashok Singh, Prashasti Saxena [4] conducted study was Evaluation of the Effects of Fentanyl and Dexmedetomidine as an Adjuvants in Supraclavicular Brachial Plexus Block Achieved with Ropivacaine. . 90 patients were randomly allocated to either receive 30 ml Ropivacaine 0.5% (Group 1), 30 ml Ropivacaine 0.5% with Fentanyl (Group 2) or 30 ml Ropivacaine 0.5% with Dexmedetomidine (Group 3). Mean duration of total analgesia was maximum in the group3 (619.92±21.67 min.), followed by group 2 (559.82±21.66min) and was least in group 1 (505.57±19.24 min).

Haemodynamic Changes:

In our study, we have observed statistically insignificant changes in heart rate, SBP and DBP during the intraoperative and postoperative period.

In July 2015 Soma C. Cham, Medha A. Sangawar, Umesh L. Ramtani, Bhupendra S. Chavan, Chandrashekharan Cham (6) conducted study Comparison of the Effects of Fentanyl and Dexmedetomidine in Supraclavicular Brachial Plexus Block have observed that no episode of respiratory depression or hypoxaemia was observed in any patient of the study intra-operatively and 24 hrs postoperatively.

Complication And Side Effects:

There was no incidence of headache, nausea, vomiting, hypotension, bradycardia, chest pain, coughing, convulsion and respiratory depression and procedure related complication. There was no CNS and CVS toxicity seen in either group in our study.

CONCLUSION:

I concluded that as compared to Fentanyl 50mcg(1ml), Dexmedetomidine 100mcg (1ml) as an adjuvant to Ropivacaine (0.75%) 20ml in supraclavicular brachial plexus block for upper limb surgeries delays the onset time for sensory & motor block and prolongs the duration of sensory &motor blocks with longer duration of postoperative analgesia causing decrease in need of rescue analgesia in patients and with no side effects

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